

each market. If an applicant is a tentative selectee for either of the bands in a market, that applicant should be disqualified from participating in the lottery for the other band.

#### **IX. LICENSE TERMS**

71. All parties that commented on the license term issue were in agreement that the LMDS license term should be 10 years, not five years as tentatively proposed by the Commission. For those reasons stated in Suite 12's comments<sup>88/</sup> and in the comments of others, the Commission should make 10 years the license term for LMDS systems.

#### **X. LEASING**

72. The Commission at paragraph 20 of the Notice states: "Since it appears that video service will be, at least initially, the primary service offered in LMDS, we propose to divide each 1000 megahertz band into channels of 20 MHz each; licensees of the respective blocks will then have flexibility to use or lease portions of one or both polarization directions in each cell and to provide a wide variety of services." (Emphasis added). Suite 12 is unaware of any commenters taking a position on leasing. Suite 12 endorses the Commission's proposal to permit leasing portions of one or both polarization directions in each cell. Leasing may

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<sup>88/</sup> Suite 12 Comments, pp. 44-46.

provide an additional revenue stream and added operational flexibility to LMDS licensees; it will also permit greater access to LMDS systems by video programmers and other non-video entrepreneurs as well as greater diversity of video programming to the American public. However, Suite 12 is concerned that the privilege of leasing could be abused and transmuted into a de facto transfer of the LMDS license prior to the time the Commission would permit a de jure transfer of the license. Therefore, Suite 12 suggests that the Commission permit leasing of LMDS capacity but not until such time as the LMDS license may be transferred.

#### **XI. PATENT LICENSING ISSUES**

73. WCA again addresses the issue of Suite 12's patent, renewing its call on the Commission to require, at least during the initial development of the 28 GHz band, that any patents underlying type-accepted equipment capable of providing 28 GHz service be licensed on reasonable terms and conditions. WCA initially voiced this concern in comments filed in connection with Video/Phone Systems, Inc.'s Petition for Rulemaking, RM-7722. As in its RM-7722 comments, WCA's comments in this proceeding provide not a single shred of evidence that Suite 12 has not or will not liberally license its technology.

74. Technology licensing is not a relevant subject for proposed or final FCC rules. Indeed, the Commission itself has recognized that it has very limited, if any, authority in the patent area.<sup>89/</sup> In discussing the possibility of an RCA patent monopoly in the development of color television, the Commission refused to eliminate RCA's patented system from consideration, nor



licensing on a non-discriminatory basis.<sup>91/</sup> This action was based on authority under Title 2 of the Communications Act, which is not applicable to Suite 12, as the patent holder of LMDS technology.

76. Only once, in the case of Comsat, has the Commission actually proposed a mandatory patent licensing system. This would have converted patents resulting from work paid for out of INTELSAT funds. The FCC proposed it as a means of minimizing Comsat's competitive advantages over other U.S. companies due to its government-granted monopoly position in INTELSAT.<sup>92/</sup> Here again, however, the Commission decided to hold the patent owner to a pledge of voluntary, non-discriminatory licensing.<sup>93/</sup> In the spirit of that Commission action, Suite 12 hereby reaffirms its pledge to engage in a program of non-discriminatory licensing of its patent.

77. Both in the case of AT&T and Comsat, the Commission exercised extensive regulatory oversight and authority under title 2 of the Communications Act. By contrast, Suite 12 is a private entity that enjoys no government-granted monopoly, whose profits

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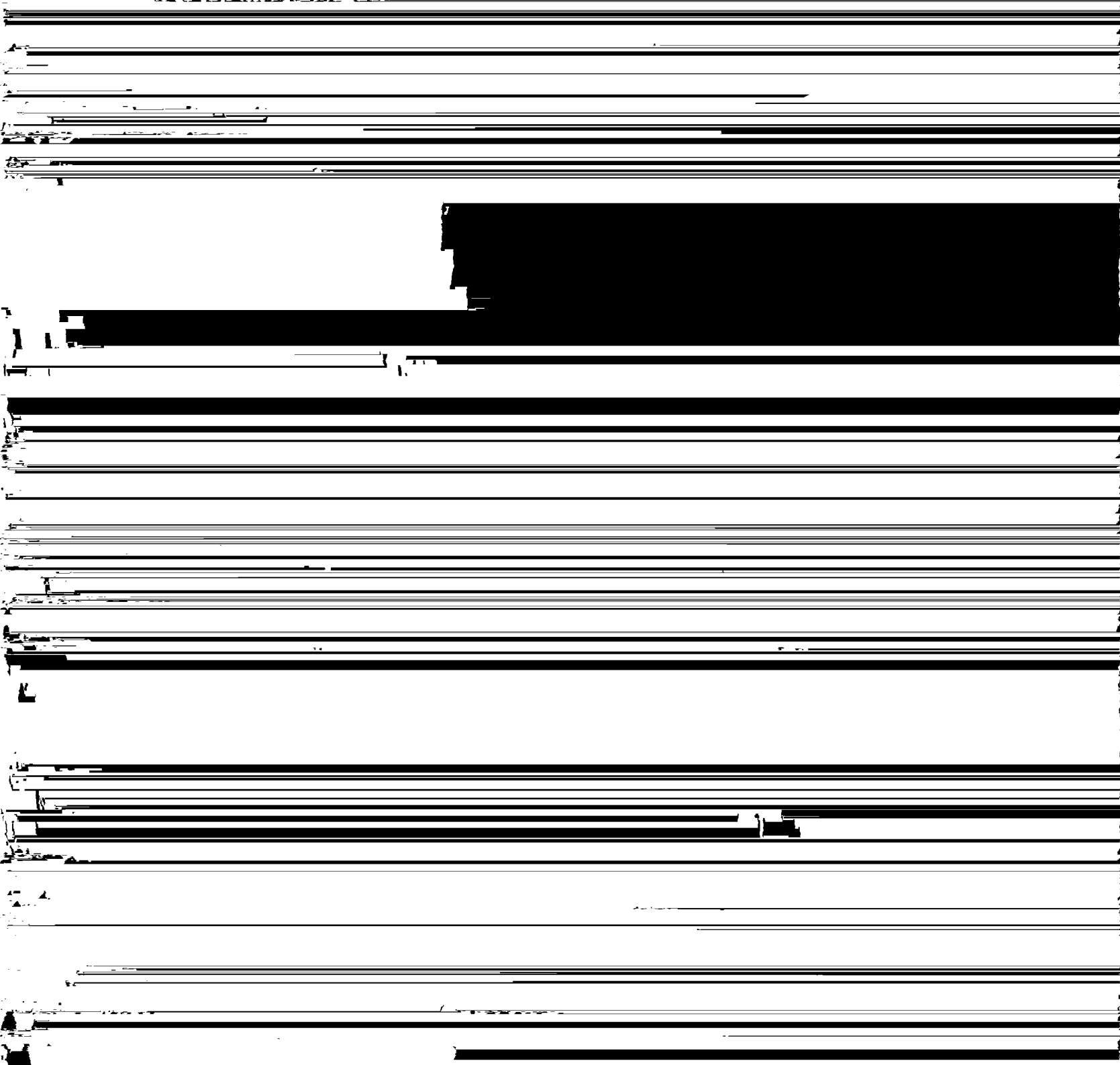
<sup>91/</sup> Revision of Part 68 of the Commission's Rules, 62 FCC 2d 735, 738 (1976).

<sup>92/</sup> Comsat Study, 77 FCC 2d 564,650 (1980).

<sup>93/</sup> Changes in Comsat Corporate Structure, 90 FCC 2d 1159, 1195 (1982).

are not regulated by the Commission, and whose business activities related to its patent are not regulated under Title 2.

78. WCA's concerns about potential misuse of Suite 12's patent are wholly unwarranted. Suite 12 has demonstrated its willingness to license its technology by liberally issuing such



statute.<sup>95/</sup> Thus, by word and by deed, Suite 12 has demonstrated its desire to license its technology liberally and equitably.

Crest surrenders its New York authorization. As Suite 12 discussed in its Comments in this proceeding,<sup>96/</sup> neither of these alternatives is an appropriate reward for its efforts in proposing, developing and testing LMDS.

82. Various comments in this proceeding agreed that Suite 12 was not adequately rewarded for its innovative efforts. For example, RSW Communications, Ltd. ("RSW") criticized the Commission's decision to condition Suite 12's preference award as being contrary to the spirit of the pioneer's preference rules and the public interest. Specifically, RSW stated that they

disagree with the Commission's tentative decision to condition the grant of Suite 12's request for a pioneer's preference for the Los Angeles market upon Suite 12's relinquishment of its license for New York ... The Commission's decision to authorize [Hye Crest] to construct a system in New York was not intended to be a pioneer's preference, nor can the pioneer's preference rules be applied retroactively to make it such. [Hye Crest] was granted a waiver of the Commission's rules ... This tentative decision by the Commission to change the effect of an order midstream creates regulatory uncertainty which, contrary to the purpose of the pioneer's preference rules, will serve to dissuade new innovative groups such as Suite 12, and ultimately deserve the public interest. In short, it is inappropriate and inconsistent with the purpose of the pioneer's preference rules for the Commission to penalize Suite 12 for its significant efforts by requiring it to abandon its New

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<sup>96/</sup> Suite 12 Comments, pp. 49-58.

York system in order to receive a pioneer's preference.<sup>97/</sup>

83. Numerous other comments praised Suite 12 for its ground breaking LMDS contributions and unequivocally supported the Commission's decision to grant Suite 12 a pioneer's preference. Some of these parties asserted that awarding Suite 12 a preference in Los Angeles would help to ensure that LMDS remains an economically viable communications service. Some of the more pertinent remarks are:

As the inventors and early investors in this technology, Suite 12 has truly pioneered this nascent industry and, in our opinion, deserves more favorable consideration for preferences in additional markets to help solidify the foundation for 28 GHz services and enhance the credibility of this emerging market. More specifically, the granting of the pioneer preference in Los Angeles as requested by Suite 12 in addition to the New York license, will give more credence to this technology in the eyes of financial investors who play a major role in the ultimate development of new and innovative telecommunication services.<sup>98/</sup>

GTE supports the award of a pioneer's preference to Suite 12 for its work in developing this new service and because the proposed service rules are substantially based on that work.<sup>99/</sup>

Suite 12 Group should be awarded its requested Pioneer's Preference for the Los



marketplace. Hereby, this award will benefit companies such as ours in creating jobs and a leadership position internationally in new technologies.<sup>100/</sup>

84. To properly reward Suite 12, the Commission must revise its tentative decision and grant Suite 12 a LMDS pioneer's preference in Los Angeles as requested. No party in this proceeding supported the Commission's decision (or underlying rationale) to condition Suite 12's preference in Los Angeles.<sup>101/</sup> Apparently, only the Commission has erroneously assumed that LMDS is not substantially different from the service provided by Hye Crest in New York. Thus, there is no reason for the Commission to condition Suite 12's preference in Los Angeles on the surrendering of the Hye Crest license.

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<sup>100/</sup> M/A COM, Inc. Comments at 2.

<sup>101/</sup> It is noteworthy that only one commenter, Box Spring Educators ("BSE"), expressed any concern about granting Suite 12 a pioneer's preference in Los Angeles. (See BSE Comments at 3.) However, BSE did not challenge Suite 12's preference award, per se. Rather, it objects to the Commission's "two licensees per market" proposal.

**XIII. CONCLUSION**

WHEREFORE, the premises considered, the Commission is respectfully requested to expeditiously adopt rules in this LMDS proceeding in accordance with the suggestions provided by Suite 12 in its Comments and Reply Comments.

Respectfully Submitted,  
SUITE 12 GROUP

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## **APPENDIX 1**

### **COMMENTS IN THE PRESS CONCERNING SUITE 12'S TECHNICAL DEMONSTRATIONS**

## APPENDIX 1

### COMMENTS IN THE PRESS CONCERNING SUITE 12'S DEMONSTRATIONS

1. Fortune Magazine April 19, 1993, "The Race To Rewire America", by Andres Kupfer.

"CellularVision, with its capable little antennas, has sent strategists scrambling at phone and cable companies alike. Such innovations could alter the balance of power. Alarmed, several Bell companies tried to squelch CellularVision's license application by filing objections with the FCC, saying the technology wouldn't work. But it does."

"Other developments, such as the rapid evolution of

and weak signals, moving to ever smaller cells with lower power at higher frequencies."

"Such a cellular system could be adapted to mobile telephone or computer services. With a bit error rate of one in 10 billion, it could theoretically transmit computer data without error correction. With one gigahertz of bandwidth, the system could function easily as a backbone for PCN applications, collecting calls from handsets operating at lower frequencies and passing them on to telephone or cellular central offices or to intelligent network facilities of the local phone companies."

"The future local loop will combine telephone, teleputer, and digital video services, together with speech recognition and other complex features, in patterns that will differ from neighborhood to neighborhood. Easily cutomizable from cell to cell, a system like Bossard's [CellularVisions] might well offer powerful advantages."

"In any case, led by Qualcomm, Steinbrecher, and CellularVision. a new generation of companies is emerging to

system. In an demonstration of this potential, I was able to see myself on the TV screen in one of the apartments as a closed circuit camera relayed my image back to the transmitter site, where it was returned to the TV set I was watching. A technician at the transmitter appeared on the screen to answer questions televised from the apartment. He easily counted the number of fingers I held up in front of the camera."

4. New York Times, December 13, 1992.

"The picture quality is "just about perfect, much better than what I had before," said Michael Boyar, a subscriber since June.

5. WNBC News 4, New York, April 5, 1993, 11:00 PM, Reporter Lou Young.

". . .so the receiver is pointed toward the window (front window). The picture is rock solid. You can also pick a reflected bounce off the wall like so -- or pick up another reflected bounce coming in from the window (rear side) ."

## **APPENDIX 2**

### **ANALYSIS OF MULTIPATH AT 29 GHZ**

**BY**

**ROGER FREEMAN ASSOCIATES**

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**For the Resume of Roger L. Freeman  
Please See Appendix 5**

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April 8, 1993

## ANALYSIS OF MULTIPATH AT 29 GHZ

I have analyzed several equations to calculate fade margin due to multipath propagation at 29 GHz for a 5 km path. The bottom line is that two of the equations (derived from Vigants and Barnett) say a 0 dB fade margin is required for a time unavailability of 0.001 or path reliability of 99.9%. The Siemens equation says that about 1 dB is required.

The Siemens equation is taken from Radio System Design, page 61, equation 2.28b. I used a type B path which is described as ". . . with average fading characteristics are typically over flat or slightly undulating country where tropospheric layers may occasionally occur. They are also over hilly country, but not over river valleys or over inland waters. Type B paths are also characterized as being in coastal regions with moderate temperatures, but not over the sea or also over those steeply rising paths in hot and tropical regions."

W is the path unavailability, in our case 0.001

$$W = 8fd^{2.5} \times 10^{-7} \times 10^{-A/10}$$

f is the frequency in GHz, in our case 29

d is the path length in km, in our case 5 km

A is the fading depth in dB

Thus:

$$\begin{aligned} 0.001 &= 8 \times 29 \times 55.9 \times 10^{-7} \times 10^{-A/10} \\ &= 12969 \times 10^{-7} \times 10^{-A/10} \\ &= 0.001297 \\ 0.001/0.001297 &= 10^{-A/10} \\ 0.771 &= 10^{-A/10} \end{aligned}$$



$$\text{Log}(0.771) = -A/10$$

$$-A = -1.12$$

$$A = 1.12 \text{ dB}$$

## **APPENDIX 3**

# **AN ANALYSIS OF LMDS UPLINK INTERFERENCE TO THE MOTOROLA IRIDIUM SATELLITES**

**BY**

**ROGER FREEMAN ASSOCIATES**

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**For the Resume of Roger L. Freeman  
Please See Appendix 5**

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**ROGER FREEMAN ASSOCIATES**  
**INDEPENDENT CONSULTANTS IN TELECOMMUNICATIONS**

in our analysis is taken directly from Table 1 as well as free space loss (FSL) and satellite antenna gain.

### 3. REVIEW OF MOTOROLA COMMENTS AND RESULTS

plot, at 15 degrees the LMDS antenna gain is down 14 dB from peak. Peak radiation is +10 dBi; at 15 degrees the antenna gain is -4 dBi.

Satellite antenna gain is 28 dBi (Table 1, Reference 1). Satellite receiving system noise temperature has been taken from Reference 1, page 3 at 1295 K. Thus the noise floor for an IRIDIUM receiving transponder is  $-228.6 \text{ dBW/Hz} + 10\log 1295 = -197.5 \text{ dBW/Hz}$ . This agrees with Table 1, Reference 1.

The EIRP of the LMDS system for one cell is +13 dBW -1 dB (line loss) -4 dBi = +8 dBW over 1000 MHz or -82 dBW/Hz. Table 1 of Reference 1 uses a community of LMDS interferers total 25 of cells. Thus the total equivalent interference EIRP is -82 dBW/Hz +  $10\log 25$  or -82 dBW/Hz + 13.98 dB or -68.02 dBW.

#### 4.2 Interference Link Budget

The free space loss (FSL) is 189 dB and is taken from Table 1.

**REFERENCES**

1. Comments of Motorola Satellite Communications, Inc. to the Federal Communications Commission CC Docket No. 92-297, RM-7872; RM-7722, March 16, 1993. Includes Technical Appendix LMDS Comments.
2. Appendix B to ARC Professional Services Group C<sup>3</sup>I Systems Division under contract to NASA (no date) - "Sharing between Local Multipoint Distribution Services and Other Services in the 27.5 - 29.5 GHz Band."
3. Andrew Corporation Antenna Radiation Pattern. Enclosure to Andrew Letter to B. Bossard dated April 4, 1993.

## **APPENDIX 4**

### **AN ANALYSIS OF UPLINK LMDS INTERFERENCE TO THE NASA ACTS SATELLITES**

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**For the Resume of Roger L. Freeman  
Please See Appendix 5**

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April 11, 1993

**AN ANALYSIS OF UPLINK LMDS INTERFERENCE**  
**TO THE NASA ACTS SATELLITES**



4.3.1-1 where they derive poor interference to noise ratio values due to LMDS transmitters.

The weakest point in their argument is the LMDS antenna gain at a 30-degree elevation angle. Assuming the +10 dBi main lobe of the LMDS antenna is at 0-degree elevation angle (It is at this angle which will give the best subscriber performance), then at a 30-degree elevation angle used in their model, the gain is down 20 dB or there is a -10 dBi antenna gain towards the ACTS satellite based on their data and Reference 3. They used a 0-dBi gain, or a discrepancy of 10 dB. It is interesting to note that we have antenna data from several manufacturers. In each case for their +10 dBi antenna, the off-boresight characteristics are nearly the same.

The second bullet again gives a 20 sq. mile cell size. Again this is not in keeping with their own data.

Insufficient data is provided to verify their findings in Figure 4.3.1-1, even if their input data is fallacious. We tried to apply the >32 dBi gain and its equivalent beamwidth criterion they gave, and neither area of coverage for ACTS satellite seems to meet this criterion.

If we assumed the aggregate EIRP of one cell serving 49 TV channels were +11.9 dBW, then 6094 LMDS transmitters would have an equivalent interference EIRP of  $+11.9 \text{ dBW} + 10 \log 6094 = 11.9 + 37.8 = +49.7 \text{ dBW}$ . Converting this value to a per Hz value, we get -40.3 dBW/Hz.

We calculate the free space loss at -212.97 dB, thus, without other losses, the IRL at the ACTS satellite is -253.27 dBW. In Table 4.3.1-1, they claim the aggregate interference level is -200.7 dBW with an IRL of -271.16 dBW, thus their antenna gain is about 53 dB. This corresponds to about a 0.38 degree beamwidth which would cover an area of about 25,000 sq. miles, about 1/5 of the value given in Figure 4.3.1-1.

We cannot track and correlate the findings in Table 4.3.1-1 with the Table given in the Appendix 1 of the same document. There are no wide beamwidth antennas, only 52 and 43 dB gains.

The Reference 1 report does not take into account line losses nor polarization loss on the link, nor does it take into account that half the LMDS antennas are polarized orthogonally from the other half, and so on.

Unless we can be provided more reliable and complete parameters, we cannot justify their findings.

#### 4. OUR INTERFERENCE ANALYSIS

##### 4.1 Introduction

We have carried out an analysis somewhat more in traditional system engineering methodology by completeness and identification of source data. For example, our LMDS model has been taken from Reference 1, Figure 2.1, LMDS Characteristics. Several differences to the model are identified, such as antenna gain.